

2018 Winnebago System Sturgeon Spawning Assessment Summary Report

Ryan Koenigs, Winnebago Sturgeon Biologist

Introduction

The Lake Winnebago System is home to one of the nation's largest lake sturgeon populations (~43,000 adults), while also providing the world's largest recreational fishery for the species. Each spring, mature lake sturgeon migrate up the Wolf, Embarrass, Little Wolf and upper Fox rivers to spawn. There are more than 60 known spawning sites within the Winnebago System, with the largest concentration of sites located between New London and Shawano on the Wolf River. Some sites receive annual spawning activity, while others are only periodically used.



Pod of spawning lake sturgeon observed at the Sturgeon Trail in New London during the 2018 spawning run.

Each spring, the annual sturgeon spawning run receives extensive interest from the media and general public, particularly at publicly assessable sites like the Sturgeon Trail (New London), Bamboo Bend (Shiocton), and the Shawano Paper Mill Dam (Shawano). These sites allow the public to view hundreds of sturgeon spawning on rocky shorelines, creating a world class viewing experience, literally within reach. The annual Sturgeon Guard program also provides volunteers with an opportunity to sign up for shifts to protect spawning lake sturgeon during

this critical period. Interested volunteers can find more information at: <https://dnr.wi.gov/topic/fishing/sturgeon/sturgeonguard.html>.

The annual lake sturgeon spawning run is also important to the DNR's management of the sturgeon population and fishery on the Winnebago System. DNR crews capture spawning fish and collect critical biological data to monitor population trends. The first spawning stock assessment was conducted in 1953, with annual assessments occurring from 1953-1964. Assessments were not conducted for a decade but resumed in 1975 and have occurred every year since. Data collected during lake sturgeon stock assessments have provided managers with a better understanding of the factors that affect population trends. For example, tag recapture events have provided data for biologists to estimate that the average male lake sturgeon spawns every 2 years and the average female spawns every 4 years. Historical mark-recapture data have also provided the framework to estimate population abundance and exploitation (harvest) rates during the annual spear fishery. Therefore, the spawning stock assessment has historically been, and continues to be, critical for effective management of the sturgeon population.

Primary assessment objectives are to: 1) mark fish for estimates of abundance and exploitation (harvest rates), 2) monitor size structure, 3) evaluate growth and mortality, 4)

evaluate movement, and 5) determine river and spawning site fidelity of adult lake sturgeon. This report focuses on data collected during the 2018 lake sturgeon spawning stock assessment conducted on the Winnebago System.

Methods

Peak spawning typically occurs when water temperature is 52-58 degrees Fahrenheit. In most years, spawning occurs somewhere between April 10 and May 5. The average spawning run lasts only 7 days, but duration is heavily impacted by weather. Cooler temperatures tend to result in longer spawning runs, while warm temperatures result in more condensed runs. DNR fisheries staff work the duration of the spawning run and handle as many fish as possible.

During the assessment, spawning lake sturgeon are captured along shore using large dip nets. Typically, 2-3 dippers work together to corral fish. All captured fish are measured to the nearest 0.1" (total length, TL, measured to longest point of the caudal fin). Sex and spawning stage (green, ripe, or spent) is determined for each fish based on extrusion of gametes (eggs or milt). The last step is to inspect each fish for external (Monel) and internal (PIT; passive integrated transponder) tags. PIT tags are located near the head of the fish and require scanning with a PIT tag reader to determine whether a tag is present or not. Tag number is documented for each recaptured fish and PIT tags are inserted into all unmarked fish. All fish are then released at the capture location.



DNR tagging crew collects length, sex and tagging data from a sturgeon captured below the Shawano Paper Mill Dam.

NOTE: Monel tags were used to mark fish with unique identification numbers for much of the 1950s through 2002, but internal PIT tags have been used to mark fish since 1999. Fish were marked with both tag types from 1999-2002, but tagging with Monel tags ceased midway through 2002 due to poor observed retention rates of Monel tags relative to PIT tags.

Results and Discussion

Lake sturgeon were captured from 3 locations along the upper Fox River between April 25-28 (Table 1). Electrofishing was utilized to capture 41 pre-spawn fish between Princeton and Berlin on April 25 and 27, while dip nets were used to capture 103 spawning fish below the Eureka Dam on April 27-28. An additional 14 sturgeon were sampled during a 2nd run in Princeton on May 14. All sampling efforts combined to yield

a total catch of 158 fish (38 females, 119 males and 1 unknown; Table 1) on the upper Fox River.

The first tagging record for lake sturgeon on the upper Fox River was in 1962 and there have been intermittent assessments since. The 158 fish captured during 2018 assessments is the most fish ever handled from the upper Fox River in a year, shattering the previous record of 89 fish captured in 1981. The considerable number of fish handled in 2018 relative to other years is likely due to a combination of increased sampling effort, particularly with pre-spawn electrofishing, and the timing of sampling at Eureka overlapping with peak spawn at that location. We handled 103 fish over the course of 2 days at Eureka, including a disproportionate percentage of females relative to other sites on the Wolf River. In two days, 36 females were handled at Eureka, whereas only 28 females were captured during the first four days of sampling within the Wolf River watershed.

Second and third spawning runs are common for lake sturgeon. These secondary runs are typically very short, usually just 1 day, and include a small number of females. Most females spawn during the primary run, but every year there are a few females that ovulate a bit later in the spring. DNR staff have periodically captured fish during these secondary runs, but catch has predominantly been males and a small number of fish relative numbers captured during the primary run. All 14 fish handled during the 2nd run in Princeton were males.

The DNR has been working on a collaborative project with Sturgeon for Tomorrow and the School of Freshwater Sciences at the University of Wisconsin Milwaukee to augment the sturgeon population and spawning run on the upper Fox River by stocking sturgeon. Since 2002, 30,477 larvae, 9,265 fingerlings, 2,317 yearlings, and 43 fish >age-2 have been stocked in the upper Fox River. Most of the fish have been stocked in Princeton or Montello, but there have also been fish stocked in Berlin and Germania (Mecan River). Fish stocked as fingerlings or older were marked with PIT tags prior to release to assess survival, movement, recruitment and spawning location(s) used once sexual maturity is reached. The first year class stocked was from 2001 (age-17), therefore



Juvenile lake sturgeon reared in a circular tank at the School of Freshwater Science at the University of Wisconsin Milwaukee.

the males from the earlier year classes should be starting to reach maturity (males reach maturity between 14-20 years of age on the Winnebago System). In fact, we captured the first spawn run male in Princeton during 2017 spawning stock assessments. That particular fish was stocked in 2003 as an 11.3" yearling and then recaptured at age 15 and 48.5". A second spawn run male was captured in Princeton during 2018 spawning stock assessments. This fish was also stocked in 2003 as a yearling (11.4") and recaptured at age-16 and 49.8" in 2018. It's only two fish, but the

preliminary results have been promising. Both fish were recaptured in the Fox River, which is in direct support for the primary objective of bolstering the spawning runs in the Fox River. Through time, these stocked fish will provide DNR staff with data to evaluate the success of stocking events, assess survival and movement of stocked fish, and estimate natural recruitment to the system.

Sturgeon spawning within the Wolf River watershed commenced on April 29, 2018 and finished 6 days later on May 5, 2018. Fish were observed spawning at more than a dozen locations throughout the Wolf, Little Wolf and Embarrass rivers. However, high water levels and the quick progression of the spawning run limited sampling to 8 sites, mostly within the Wolf River. Among the seven sites sampled on the Wolf River, 869 sturgeon were captured (Table 1). There were also 103 sturgeon captured at Pfeifer Park on the Embarrass River over a two-day period. The largest number of fish were captured at the Shawano Dam (Table1), however, this site also received the greatest sampling effort.

Overall, the 2018 spawning stock assessment was a year of mixed results. A record number of sturgeon were captured from the upper Fox River, but the overall total of 1,113 fish captured was the lowest since 2013. The relatively low number of fish handled from the Wolf River watershed is mostly attributable to the high water levels following runoff from an early April snow storm (Figure 1). The median discharge for the Wolf River in late April through early May is between 3,000-3,500 cubic

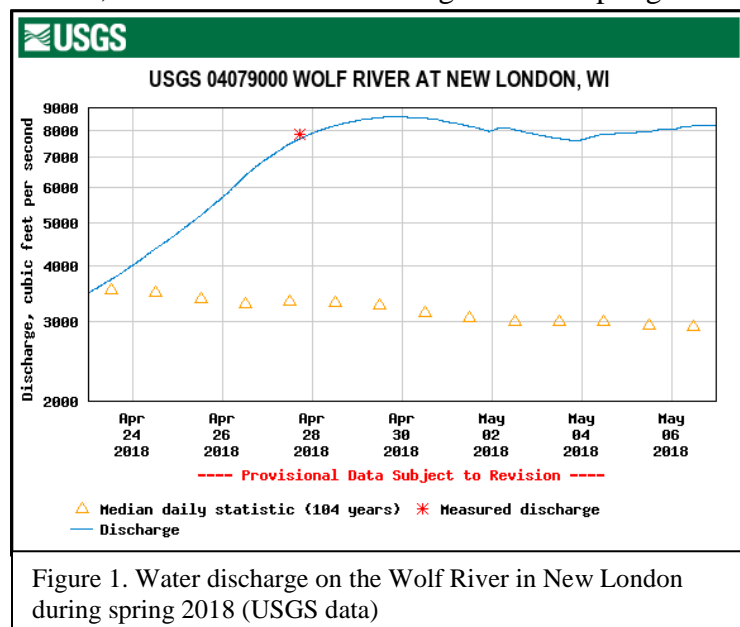


Figure 1. Water discharge on the Wolf River in New London during spring 2018 (USGS data)

feet per second (cfs). In comparison, the Wolf River discharge during the 2018 sturgeon spawning run was around 8,000 cfs (Figure 1). The high flows made it difficult to capture spawning fish as they were spawning further down the bank and dippers were unable to capture many of the them. Water levels below the Shawano Dam were so high that dippers wading below the dam could feel fish moving along the river bottom but were unable to net the fish due to the deep water.

The average length of female lake sturgeon captured during the spring assessment was 65.5" (range 49.3-80.3") while the average length of males was 57.9" (range 42.7-72.9") (Figure 2). Female sturgeon 62-72" accounted for 64.2% of the fish handled, while 57.5% of the males captured were 52-62" (Figure 2). Lake sturgeon that are 70 inches or longer are normally considered "trophy" size. Lake sturgeon exhibit sexual dimorphic growth with females reaching larger lengths than males meaning that most of the fish larger than 70" are females. Roughly 20% of the adult female lake sturgeon captured during recent spawning stock assessments have been larger than 70" and 2018 was similar with 22.9% of the female lake sturgeon captured exceeding 70".

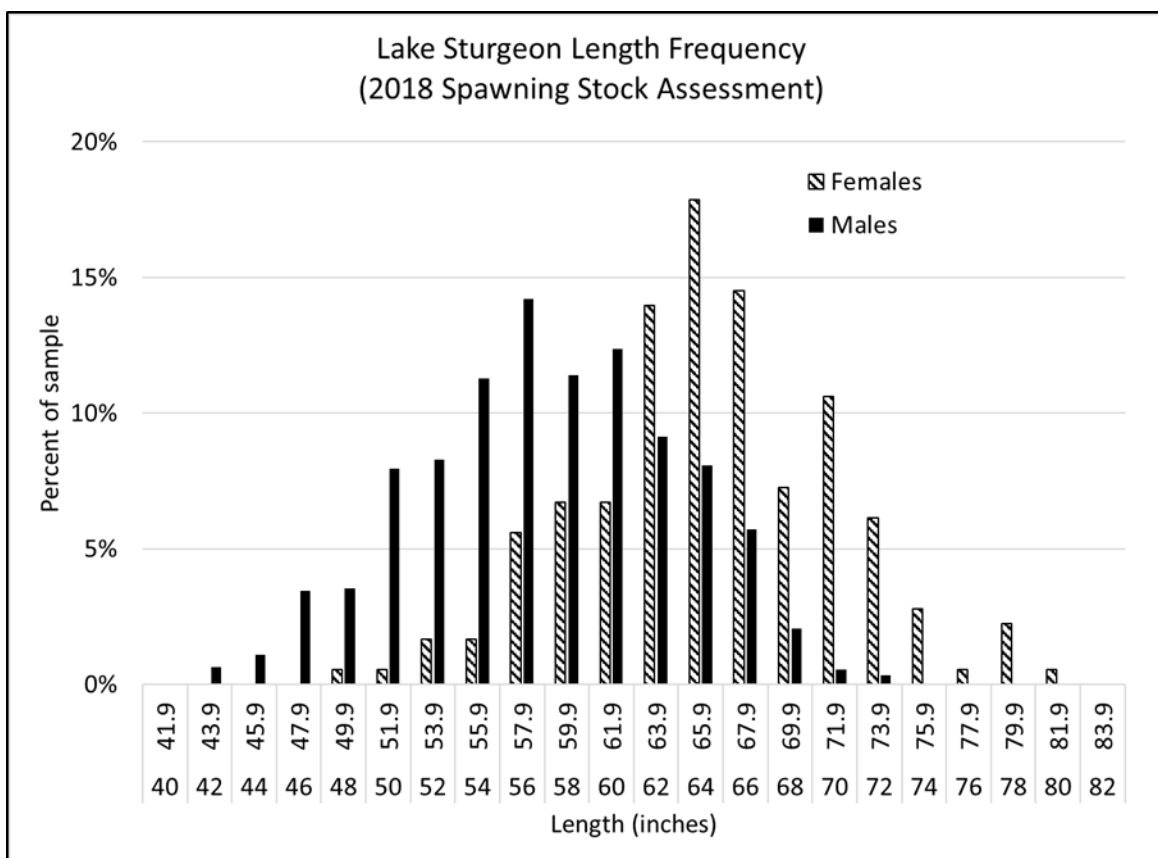


Figure 2. Size structure of adult female and male lake sturgeon handled during the 2018 spawning stock assessment conducted on the Winnebago System.

The Lake Winnebago System serves as an important brood source for multiple lake sturgeon rehabilitation programs. In 2018, we were able to collect an adequate number of eggs from Wolf River lake sturgeon to meet the stocking goals for restoration efforts on Lake Michigan (streamside rearing facilities on the Milwaukee and Kewaunee Rivers) and the Tennessee River watershed (fish stocked into Georgia, Tennessee and Kentucky). Eggs were also collected and fertilized for the Genoa National Fish Hatchery in La Crosse.

Data collected from fish handled during the spawning assessments are critical for proper management of Winnebago System lake sturgeon population and spear fishery. Marking sturgeon of known sex during spring spawning stock assessments is required to derive abundance estimates that are used to establish safe harvest limits for the winter sturgeon spear fishery. We are fortunate that this assessment, along with all other sturgeon related management activities, is funded by revenue generated from the sale of sturgeon spearing licenses. Thank you to everyone that purchases a license and contributes to the Winnebago System lake sturgeon assessment program.

The sturgeon spawning run on the Winnebago System is truly a unique event. I strongly suggest making plans to check it out if you have never seen it. Predicting exactly when fish will be spawning and where is very difficult. Fish normally only spawn at a site for 2-3 days, so it's important to be flexible with travel plans and make arrangements to

see the spawning shortly after hearing about it. More information about the sturgeon spawning run on the Winnebago System is available at the link below.

<https://dnr.wi.gov/topic/fishing/sturgeon/sturgeonspawning.html>

I hope you found this report interesting and informative. Feel free to contact me by email (Ryan.koenigs@wisconsin.gov) or phone (920-303-5450) if you have any questions related to lake sturgeon management on the Winnebago System.

Ryan Koenigs

Ryan Koenigs
Winnebago Sturgeon Biologist

Date	Location	Waterbody	# Females	# Males	# Total
04/25/2018	Princeton	Fox	0	11	11
04/25/2018	Berlin	Fox	1	9	10
04/27/2018	Princeton	Fox	0	10	10
04/27/2018	Berlin	Fox	1	9	10
04/27/2018	Eureka	Fox	17	33	50
04/28/2018	Eureka	Fox	19	33	53
04/29/2018	Sturgeon Trail	Wolf	3	42	45
04/30/2018	Sturgeon Trail	Wolf	16	89	107
05/01/2018	Sturgeon Trail	Wolf	4	58	62
05/01/2018	Pfeifer Park	Embarrass	1	36	37
05/02/2018	Bamboo Bend	Wolf	2	52	54
05/02/2018	Pines	Wolf	0	18	18
05/02/2018	Pfeifer Park	Embarrass	2	46	49
05/02/2018	Sturgeon Trail	Wolf	0	19	19
05/03/2018	Diemel's	Wolf	22	156	180
05/03/2018	Pines	Wolf	4	29	33
05/03/2018	Hwy 156	Wolf	0	17	17
05/03/2018	Shawano Dam	Wolf	8	19	27
05/04/2018	Shawano Dam	Wolf	77	214	291
05/05/2018	Shawano Dam	Wolf	1	15	16
05/14/2018	Princeton	Fox	14	0	14

Table 1. Number of lake sturgeon (female, male, total) handled at spawning sites throughout the Winnebago System during the 2018 spawning stock assessment.